

**AMENDMENT AND RESPONSE****PAGE 2**

Serial No.: 09/727,246

Filing Date: November 30, 2000

Attorney Docket No. 100.142US01

Title: **CLOCK RECOVERY MECHANISM**

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**Amendments to the Claims:**

This listing of claims will replace all prior versions and listings of claims in the application:

**Listing of claims:**

1. (Original) A method for providing a seed frequency for a receive clock, comprising:  
estimating a frequency of an incoming clock signal;  
embedding the estimated frequency into a transmitted data stream;  
capturing the embedded estimated frequency; and  
seeding a control loop of the receive clock with the estimated frequency.
2. (Original) The method of claim 1, and further comprising:  
buffering the incoming data in an input buffer.
3. (Original) The method of claim 1, wherein estimating the frequency comprises:  
creating a representation of the data frequency in fewer bits than a full frequency identifier.
4. (Original) The method of claim 1, wherein estimating the frequency comprises:  
estimating a 32 bit control word with an 8 bit estimate.
5. (Original) The method of claim 4, wherein estimating a 32 bit control word comprises:  
spreading an 8 bit estimate over a full range of 32 bit values.
6. (Original) The method of claim 1, wherein estimating a frequency comprises:  
determining a count frequency based on a sampling frequency and a usable range of control words; and  
operating an oscillator at the count frequency to gate a counter.

**AMENDMENT AND RESPONSE****PAGE 3**

Serial No.: 09/727,246

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7. (Original) The method of claim 1, wherein capturing the estimated frequency comprises:  
generating a count frequency by multiplying the frequency estimate by a maximum frequency divided by the range value for the bit estimate; and  
counting the incoming pulses over the inverse of the count frequency.
8. (Previously presented) The method of claim 1, and further comprising:  
buffering received data in an output buffer; and  
matching the flow rate of incoming data into the input buffer and out of the output buffer.
9. (Original) A method of recovering a clock signal for a buffer, the method comprising:  
buffering incoming data in a buffer;  
formulating a frequency estimate based on a data rate of the incoming data;  
providing the frequency estimate and the incoming data to an asynchronous transfer mode (ATM) segmentation and reassembly sublayer;  
encoding the frequency estimate into ATM traffic;  
sending the ATM traffic to a receiver; and  
seeding a frequency lock algorithm with the estimate.
10. (Original) The method of claim 9, wherein seeding a frequency lock algorithm comprises:  
recovering the frequency estimate from the received ATM traffic; and  
decoding the estimate.
11. (Original) The method of claim 9, and further comprising:  
adjusting a depth of the input buffer to facilitate throughput management.
12. (Original) The method of claim 9, and further comprising:  
buffering received data in an output buffer; and  
adjusting a depth of the output buffer to match the inflow of data at the input buffer.

## AMENDMENT AND RESPONSE

PAGE 4

Serial No.: 09/727,246

Filing Date: November 30, 2000

Attorney Docket No. 100.142US01

Title: CLOCK RECOVERY MECHANISM

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13. (Original) A method for seeding a frequency of a receive clock, comprising:  
creating an estimate of a frequency of an incoming clock signal;  
embedding the estimate in a data stream to be sent to the receive clock;  
recovering the embedded estimate from the data stream;  
decoding the estimate; and  
setting an initial phase locked loop range according to the decoded estimate.
14. (Original) A method for adaptively clocking a telecommunications system, comprising:  
estimating a frequency of an incoming data stream;  
encoding the estimate of the frequency into network traffic;  
decoding the estimate at a receive end of the system; and  
seeding the receive end clock with the frequency estimate.
15. (Currently Amended) A telecommunications system, comprising:  
a transmit end with an incoming data frequency estimator;  
a receive end with an estimate recovery module; and  
a data path therebetween for transmitting data and a frequency estimate of the data;  
wherein the receive end comprises:  
system interface logic to receive network traffic;  
logic to recover a frequency estimate and data from the network traffic;  
a buffer to hold output data; and  
a clock recovery circuit to decode the frequency estimate.
16. (Original) The telecommunication system of claim 15, wherein the transmit end comprises:  
a user data protocol interface to receive incoming data;  
a frequency estimator;  
a data buffer having buffer control circuitry;

**AMENDMENT AND RESPONSE**

PAGE 5

Serial No.: 09/727,246

Filing Date: November 30, 2000

Attorney Docket No. 100.142US01

Title: **CLOCK RECOVERY MECHANISM**

---

segmentation and reassembly (SAR) logic connected to the data buffer and to the frequency estimator to combine the data and the frequency estimate into network traffic; and system interface logic to receive the network traffic from the SAR logic and to transmit the traffic along the network.

17. Cancelled

18. (Original) A transmit end of a telecommunications system, comprising:  
a user data protocol interface to receive incoming data;  
a frequency estimator;  
a data buffer having buffer control circuitry;  
segmentation and reassembly (SAR) logic connected to the data buffer and to the frequency estimator to combine the data and the frequency estimate into network traffic; and  
system interface logic to receive the network traffic from the SAR logic and to transmit the traffic along the network.

19. (Original) A transmitter, comprising:  
a protocol interface module to receive a data input;  
a frequency estimator connected to the protocol interface module;  
an encoder connected to the frequency estimator and to the protocol interface to encode data and a frequency estimate into a network data stream; and  
interface logic to transmit the data stream.

20. (Original) The transmitter of claim 19, wherein the frequency estimator comprises:  
a serial to parallel converter;  
a clock frequency multiplier;  
a divider  
a digital signal processor (DSP) running an adaptive read clock algorithm; and

**AMENDMENT AND RESPONSE****PAGE 6**

Serial No.: 09/727,246

Filing Date: November 30, 2000

Attorney Docket No. 100.142US01

Title: **CLOCK RECOVERY MECHANISM**

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a digitally controlled oscillator (DDS) having a clock synthesizer to clock data out of the buffer.

21. (Original) A logic module, comprising:
  - a clock control module to receive a data signal and a clock signal; and
  - a data control module connected to the clock control module to coordinate data flow and to generate a control signal for a receive end.
22. (Original) The logic module of claim 21, wherein the clock control module comprises:
  - a clock frequency estimator; and
  - a word clock generator.
23. (Original) The logic module of claim 21, wherein the data control module comprises:
  - an encoder to encode the clock frequency estimate into the data signal.
24. (Original) The logic module of claim 22, wherein the clock frequency estimator comprises:
  - a counter; and
  - an oscillator operating at a predetermined frequency as a gate for the counter.
25. (Original) A receive end of a telecommunications system, comprising:
  - system interface logic to receive network traffic;
  - logic to recover a frequency estimate and data from the network traffic;
  - a buffer to hold output data; and
  - a clock recovery circuit to decode the frequency estimate.
26. (Original) The receive end of claim 25, wherein the clock recovery circuit comprises:
  - a digital signal processor (DSP) running an adaptive read clock algorithm; and

**AMENDMENT AND RESPONSE****PAGE 7**

Serial No.: 09/727,246

Filing Date: November 30, 2000

Attorney Docket No. 100.142US01

Title: **CLOCK RECOVERY MECHANISM**

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a digitally controlled oscillator (DDS) having a clock synthesizer to clock data out of the buffer.

27. (Original) The receive end of claim 26, wherein the adaptive read clock algorithm performs a method comprising:

    multiplying the recovered frequency estimate by a predetermined value to recover a DDS control word; and

    conveying the control word to the DDS.

28. (Original) The receive end of claim 25, and further comprising:

    a digital filter to generate a DDS control word to be conveyed to the clock synthesizer.

29. (Original) A receiver, comprising:

    a protocol interface module to receive network traffic containing an embedded frequency estimate;

    asynchronous transfer mode (ATM) logic connected to the protocol interface module to recover embedded frequency estimate data from the network traffic;

    a buffer connected to the ATM logic to receive the data; and

    determination logic to receive the estimation data and to recover the frequency estimate.

30. (Original) The receiver of claim 29, wherein the determination logic comprises:

    a digital signal processor (DSP) running an adaptive read clock algorithm; and

    a digitally controlled oscillator (DDS) having a clock synthesizer to clock data out of the buffer.